

Claims

1. Apparatus for induction heating of pieces or blanks (10) of electrically conducting and non-magnetic material, characterized in that it comprises a device for creating a static magnetic field (3) and a device (2) for causing a relative movement (4) between the piece or blank (10) and the static magnetic field (3), so that current (12) is induced in the piece or blank (10) which thereby is being heated up.
2. Apparatus according to claim 1, wherein the device for creation of the static magnetic field (3,32) comprises at least one coil (52,53) adapted to entirely or partially surround the piece or blank (10).
3. Apparatus according to claim 2, wherein the at least one coil (52,53) has windings comprising superconducting material.
4. Apparatus according to claim 2 or 3, wherein the at least one coil (52,53) has annular sections surrounding the piece or blank (10) and being connected in anti-parallel, so that the static magnetic field (32), which is created, varies in axial direction, the device (2) for relative movement being arranged to cause a relative linear movement (42) in the same axial direction between the piece or blank (10) and the static magnetic field (32).
5. Apparatus according to claim 1, wherein the device for creating of the static magnetic field (3,31) comprises at least one permanent magnet (51).

6. Apparatus according to claim 5, wherein the at least one permanent magnet (51) is included in an annular permanent magnet device arranged to surround the piece or blank (10).

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7. Apparatus according to claim 6, wherein the annular permanent magnet device (51) comprises several poles, for example four, so that the magnetic field (31), that is created, is directed into and out of the piece or blank (10) several times along its periphery, the device (2) for relative movement being arranged to cause a relative rotational movement (4) between the piece or blank (10) and the static magnetic field (31).

8. Apparatus according to claim 6, wherein the annular permanent magnet device comprises a number of annular sections, so that the static magnetic field, that is created, varies in axial direction, the device (2) for relative movement being arranged to cause a relative linear (42) movement in the same axial direction between the piece or blank (10) and the static magnetic field.

9. Apparatus according to any one of claims 1-8, wherein the device (2) for relative movement is arranged to move the piece or blank (10) in relation to the static magnetic field (3,31,32).

10. Apparatus according to any one of claims 1-8, wherein the device for relative movement is arranged to move the device for creation of the static magnetic field (3,31,32) in relation to the piece or blank (10).

11. Apparatus according to any one of claims 1-10,
wherein the device for creation of the static magnetic
field (3,31,32) comprises at least one permanent magnet
(51) and at least one coil (52,53) preferably comprising
5 windings of superconducting material.

12. Apparatus according to any one of claims 1-11,
further comprising a device for creation of an alternating
magnetic field, so that the static magnetic field
10 (3,31,32) is combined with the alternating magnetic field
thereby having a common effect on the piece or blank (10).

13. Method for induction heating of pieces or blanks (10)
of electrically conducting and non-magnetic material,
15 characterized in that it comprises the following steps:
- creating a static magnetic field (3,31,32), and
- causing a relative movement (4,41,42) between the
piece or blank (10) and the static magnetic field
(3,31,32), so that current (12,12A) is induced in the
20 piece or blank (10) which thereby is being heated up.

AMENDED CLAIMS

[received by the International Bureau on 13 May 2004 (13.05 04);
original claims 1-13 replaced by amended claims 1-11;
claims 12-13 canceled, (pages 03)]

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STATEMENT

1. Apparatus for induction heating of pieces or blanks
(10) of electrically conducting and non-magnetic material,
5 comprising a device for creating a static magnetic field
(3) and a device (2) for causing a relative movement (4)
between the piece or blank (10) and the static magnetic
field (3), so that current (12) is induced in the piece or
blank (10) which thereby is being heated up, wherein the
10. device for creation of the static magnetic field (3)
comprises at least one coil (52,53) comprising windings of
superconducting material.

2. Apparatus according to claim 1, wherein the at least
15 one coil (52,53) is adapted to entirely or partially
surround the piece or blank (10).

3. Apparatus according to claim 1 or 2, wherein the at
least one coil (52,53) has annular sections surrounding
20 the piece or blank (10) and being connected in anti-
parallel, so that the static magnetic field (32), which is
created, varies in axial direction, the device (2) for
relative movement being arranged to cause a relative
linear movement (42) in the same axial direction between
25 the piece or blank (10) and the static magnetic field
(32).

4. Apparatus according to claim 1 or 2, wherein the
device for creating of the static magnetic field (3,31)
30 further comprises at least one permanent magnet (51).

5. Apparatus according to claim 4, wherein the at least one permanent magnet (51) is included in an annular permanent magnet device arranged to surround the piece or blank (10).

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6. Apparatus according to claim 5, wherein the annular permanent magnet device (51) comprises several poles, for example four, so that the magnetic field (31), that is created, is directed into and out of the piece or blank (10) several times along its periphery, the device (2) for relative movement being arranged to cause a relative rotational movement (4) between the piece or blank (10) and the static magnetic field (31).

7. Apparatus according to claim 5, wherein the annular permanent magnet device comprises a number of annular sections, so that the static magnetic field, that is created, varies in axial direction, the device (2) for relative movement being arranged to cause a relative linear (42) movement in the same axial direction between the piece or blank (10) and the static magnetic field.

8. Apparatus according to any one of claims 1-7, wherein the device (2) for relative movement is arranged to move the piece or blank (10) in relation to the static magnetic field (3,31,32).

9. Apparatus according to any one of claims 1-7, wherein the device for relative movement is arranged to move the device for creation of the static magnetic field (3,31,32) in relation to the piece or blank (10).

10. Apparatus according to any one of claims 1-9, further comprising a device for creation of an alternating magnetic field, so that the static magnetic field (3,31,32) is combined with the alternating magnetic field thereby having a common effect on the piece or blank (10).

11. Method for induction heating of pieces or blanks (10) of electrically conducting and non-magnetic material, comprising the following steps:

- 10 - creating a static magnetic field (3,31,32), and
- causing a relative movement (4,41,42) between the piece or blank (10) and the static magnetic field (3,31,32), so that current (12,12A) is induced in the piece or blank (10) which thereby is being heated up,
- 15 wherein the static magnetic field (3,31,32) is being produced by at least one coil (52,53) comprising windings of superconducting material.

STATEMENT UNDER ARTICLE 19 (1)

Reference is made to the International Search Report having the 23rd of March 2004 as a mailing date.

New amended claims are presented.

The new amended apparatus claim 1 is based on features taken from the original claims 1, 2 and 3.

The original claim 11 is cancelled.

The new amended method claim 11 is based on features taken from the original claims 13, 2 and 3, and the description.

There is not introduced any new matter to the amended claim set.

None of the cited publications discloses that the device for creation of the static magnetic field comprises at least one coil comprising windings of superconducting material. Moreover the piece or blank, that is to be heated, is of electrically conducting and non-magnetic material.

We respectfully request that the Examiner considers the above arguments when examining the amended claims and preparing the International Preliminary Report on Patentability (IPRP).